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342 of a dozen or more bits of wood ingenuously fastened together by seizings of sennit." Linton found that strips of wood were used to close the doorway in Pua Ma'u.

342 The interior of the house was divided lengthwise into two sections, the *ae'ae*, which was paved with smooth polished beach stones (*kua*) being in 531 front, while the whole back section was made up of the bed space. Ornamentation of houses consisted in the adzing of geometic designs on both front and end posts, and occasionally the carving of the front posts into caryatid-like figures cut in the round. The figures carved on the end posts probably faced inward. Ornamental sennit lashings, red, yellow, black, and white, bound the thatch to the frame and the parts of the frame to each other. These carved designs and ornamental sennit designs were placed so that they were seen and enjoyed by those lying on the bed space.

CANOES AND CANOE MAKING

Process of Manufacture

● 396 The following account of canoe-making is from Atu Ona, Hivo Oa. On the first day of the work the canoe-maker (*tuhuna vaka*) with his assistants, called *ta akau*, accompanied by a priest to recite the sacred chants (*tuhuna pu'e*), went up the valley where stood the *temanu* tree that had been selected. While the workers stood about the tree, the priest chanted the *pu'e*, recounting the growth of the world. Then the tree was felled, fire being used to aid in the accomplishment of it (according to Linton). This was all that was done on the first day.

On the second day the bark was removed and the work of roughing out the canoe body was begun and continued all day. A temporary shed (*oho au vaka*), open on all sides, was erected over the place where the work was going on. This building, like all other features of the enterprise, was sacred. All the workers were consecrated during the labor, sleeping at the *oho au*.

The whole body of the canoe was completed here. When this work was finished the new canoe body was carried on the shoulders of the workers to the sea where it was placed in another shed (*oho au veka*), which had been erected for the purpose on the shore. As the new hull was carried down the valley, the priest followed close behind chanting the *pu'e*.

The outrigger was made and fitted to the canoe in its house by the sea. When all the work was completed, the canoe and house in which it rested by the sea were decorated with short peeled stakes of fau (*koufau*), decorated with neatly woven green coconut leaves (*kapiripiri*), the reddish cloth made of the bark of the banyan tree, sacred white cloth and human

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hair. The human hair was omitted from the decorations of fishing canoes. 396 ● The crew and warriors who were to go on board were embellished with materials similar to those used in ornamenting the canoe itself and new paddles with small images carved at the upper end of the handle were made.

Certain details of canoe building at Pua Ma'u, Hiva Oa, given to me by Mr. Linton, supplement the above account. Four hundred men were employed in the building of a certain canoe at Pua Ma'u, working under the direction of four *tuhuna*. The work was done where the tree was felled and where a decorated house was erected for the workmen. Workmen and *tuhuna* were fed by the chief, twenty men being employed in this work. The place was *tapu* to women and to strangers. Any intruder from another valley would be killed and eaten. "When the canoe was finished a great feast was held at the place of manufacture, the workmen's house being decorated with ferns and wild vines."

In the sacred chant called *oho au o Motuhaiki*, which is part of the *tona pou* chant (see Chants), and which was probably used in connection with canoe-building, are mentioned the stages in the construction of a canoe: finding the tree, trimming it, felling it, measuring and cutting out the proper length, and hollowing the hull; then building the shed for it, placing the body on two log supports in the house, thinning down the sides, polishing the body with crushed coral; then naming the various parts attached to the hull, side-boards, bow, stern, seats, etc. The first master canoe-maker was, traditionally, Motuhaiki, who noosed the sun, so that he might have sufficient time to finish his work.

Canoes, like everything else, were named. Mr. Linton was told in Pua Ma'u that new canoes were named after old ones that were worn out. Not only was the canoe itself named, but every part, the bow-piece, stern-piece, sideboards, seats, bailers, paddles, and so on.

Launching

Just before a canoe was launched, the crew and warriors were assembled about it in the *oho au*, and the *pu'e* was again chanted. The vessel was then carried into the water with all its paddlers and warriors aboard, the canoe and its crew alike being ornamented. Soon after a new war canoe had been consecrated and launched, the chief who owned it sent it to raid an enemy bay and secure sacrifice victims. It was for this purpose that the canoe had been built, and its consecration was not regarded as complete until its *mana* had been thus demonstrated. A chief would sometimes send his warriors to get victims at the time of the building of the canoe to give it *mana*.

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396 The recitation of the *pu'e*, creation chant of the world and nature, made the work complete by uniting the new product of handicraft with creation from its beginnings, right down through the growth of all things to the new canoe. (See Sacred Chants.) The bedecking of the canoe and its house had this ceremonial significance: the *koufau* were the sign of *tapu; hiapo*, the cloth that covered the loins of *tapu* men symbolized both power and sacredness; and the *kopinipini* embodied the same sense of sacredness that brought about the use of the coconut leaf as a head and body dress by priests, and as a sign of truce.

396 789 Mr. Linton found that in both Hana Hehe and Pua Ma'u, on Hiva Oa, it was the custom, when a war canoe was being made, for a warrior of great prowess to sleep on or in the log from which the hull was being formed, during the nights of the period of its manufacture. This was in order that the canoe might have imparted to it the qualities of *mana*, power, and luck, which the warrior embodied.

396 All canoes used for war or the work of fishing were *tapu* to all women except chiefesses or priestesses for the reason that their contact with the canoe would have profaned it, hence made it lose its power (*mana*). Canoes that were built for voyaging must have been an exception to this rule, for women accompanied their men on voyages. If a fishing canoe were profaned by the touch of a woman, it was purified by having hair burned on the bow (7).

Types of Canoes

501 As full details of canoe construction are given in the work of another member (20) of the Marquesas party, the subject will be treated briefly here.

In the Marquesas there were craft of all kinds varying from those merely large enough for children to play in to the great exploring canoes. Porter gives excellent descriptions of the appearance of different forms of craft that he observed when he visited Nuku Hiva. His description of fishing canoes is quoted in the section devoted to fishing, that of war canoes under war.

Of canoes constructed for exploration Porter says (24, p. 103), "The canoes formed for the sole purpose of going in search of new lands are of a still larger construction, and are rigged in the same manner." It appears that these canoes for exploration were frequently double—that is, made by lashing two canoe bodies together, leaving a space of several yards between. On the cross-pieces were laid bars forming a platform. So far as I have ascertained, the Marquesas' canoes never had a house on this platform. In the story of Pohu such a platform is described as having

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a rail around it. The supplies for a voyage were kept here and in the body of the canoe, and the people on board lived on the platform and below decks. According to a trustworthy Fatu Hiva informant, such a canoe would have two sails, the masts being stepped in the usual place in the forward end of each hull. War canoes and canoes for exploration—according to modern natives—were as much as sixty feet long. So far as I know, however, there is no record of a canoe of this size, although no limitation in the materials at the disposal of the native nor in his ability to utilize them would have prevented him from making canoes of this size or even larger.

Porter (24, p. 102) describes small temporary craft as follows:

> "They have also smaller canoes, which are commonly nothing more than the hollow keels of the large ones, after the upper works are taken off; these are furnished with outriggers, and are used for fishing about the harbour.

Materials for Canoes

Materials used most for canoe-making were *temanu, hutu* (*Barringtonia speciosa*), and *mi'o*. The size of the canoe desired frequently determined the choice of a tree. The *temanu* was the largest of the available trees, and furnished the most durable wood. According to Linton breadfruit trees were used for smaller canoes.

Parts of a Canoe[6a]

The main parts of a canoe consisted of the hull, adzed out of a tree trunk; detachable bow and stern piece; sideboards lashed on the edges of the gunwale; and an outrigger.

The main body or hull (*vaka, tua, tekee*) of the canoe was made of a hollowed single tree trunk. The bow (*piha, au'au, kanihi, hopeta*), a separate piece, was usually upturned, but both Cook (6, p. 711) and Stewart (26, p. 219) describe horizontal bows. Linton aptly describes the stern (*mu'i, hope au'au*) as narrowing "rapidly to form the tail, which was a long projection like a thick plank with the edge up, rising from the body of the stern piece at an angle of twenty to thirty degrees." (20.) The sideboards (*hue tana*) consisted of single hewn boards (*papa*) lashed (*humu*) to the gunwale of the canoe, but it is probable that the sideboards of some canoes were built up with several boards, for Porter (24, p. 79) described the sides as made of many pieces of the breadfruit tree, cut into the form of planks, and sewed together with the fibers of the outside shell of coconut. The seams are covered inside and out with strips of

6a The terminology is from Dordillon's ms. and from Linton's and my own notes.

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of the boy's sacred staging, the making of his adz and of the canoe that was to be made with adz.

The Tona-Pou Chant

The first of these chants was called simply *tona pou*, which when translated seems to mean simply "his post." This chant was for the sacred house elevated on a staging (*fata'a, tona pou*) for the boy. The object of the chant is evidently to free the structure from evil influences and to bring the good influences potent to aid in the rite. What connection the chant may have with the post outside the house, on which the spirits of ancient priests came to rest, is not apparent. I infer that the *fata'a* consecrated at this rite was that which would in future serve the boy as his *tapu* eating house and store house. (See The Family.)

The chant following this was called *tona pou no Pohu*. In the first part of it the forehead, eyes, mouth, and other features of the youth are mentioned—with what significance I was unable to ascertain. The rest of the chant has to do with house furnishings and the altar with its decoration. A short chant called *oho-au no ihi* follows, recounting the catching of certain fish, doubtless those used in connection with the rite.

Lastly comes a longer and most interesting chant, called *oho-au no Motuaiki* (work-house of Motuhaiki). Motuhaiki was an ancient master canoe builder. The first part of this chant describes the making of the rope with which Motuhaiki noosed the sun when he desired to have more time to finish his work. Then Motuhaiki and Hope'outo'i, another canoe maker and patron of carpentry, are referred to in connection with the making of the new adz for the boy, the piece of stone from which the adz was made being a chip off the block (*fatu*) described above, which is also mentioned. The chant describes the stages of making the adz head and lashing it to its handle. Then it proceeds to the successive stages of the manufacture of the canoe and its parts. This section of the chant was undoubtedly that which followed the recitation of the *pu'e* when that chant was used in connection with canoe making.

After this part, which has reference to canoe making, there follow others having to do with the making of a loin cloth, robe, headdress, and necklace for the boy (evidently those worn ceremonially in connection with the rite); then a section descriptive of the building of a temporary shelter (*oho-au*) for the boy to sleep in, the erection of fau poles (*koufau*) as a sign of the *tapu;* the erection of a shrine; and lastly, the preparation of food, the eating of which completed the boy's rite.

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CANOES

501 [177] For convenience in description, Marquesan canoes may be considered as of two main classes, modern forms, all of which show more or less European influence; and ancient, or genuine, Marquesan forms. The modern canoes are of two sorts, small fishing canoes and the form called by the natives *vaka poti* (literally, canoe boat), which is a hybrid of the European boat and the native canoe. Only two types of ancient canoe are remembered by the present natives, a small fishing canoe closely resembling the modern one, and a large war canoe. Double canoes, as described by informants, cannot be said to constitute a distinct type. Porter (49), who gives a very good account of the canoes used in Nuku Hiva at the time of his visit in 1813, describes a third type, all memory of which seems to have been lost. He also mentions a form of large double canoe used for long voyages.

MODERN CANOES

FISHING CANOES

501 ● 396 [824] Small fishing canoes are still in constant use throughout the Marquesas. Their structure and method of manufacture may be described as follows:

They range from twelve to eighteen feet in length with a beam of one foot to eighteen inches and a depth of about eighteen inches. The body of the canoe is hewn from a single log of breadfruit wood which is usually peeled and allowed to season for a time before shaping, but the making of some canoes begins as soon as the tree is felled. The shaping of the outside is completed before the excavation is begun. When the log has been roughly excavated with an ordinary steel axe, a short handled adz with a semicircular cutting edge is used to complete the dressing. The natives are remarkably expert in the use of these adzes, and the cuts left by them are as regular as though made by machinery, even on surfaces that will later be rubbed smooth. The outside of the canoe is rubbed down with sand paper after shaping until all the adz marks are obliterated. In the finished body, the sides are three-quarters of an inch to an inch thick, and the bottoms are from an inch to an inch and a half thick. The sides run parallel for most of the length, beginning to taper inward two to three feet from either end. The bow and stern are indistinguishable, the bottom curving up for about one-third the depth of the body and passing imperceptably into a straight cutwater. After the body is completed, two holes are bored through each side directly opposite about two inches below the gunwale edge and about three feet from the bow and from the stern. Round pieces of hard wood about three-quarters of an inch in diameter and seven inches long are then driven through these holes forming plugs which are used in the attachment of the outrigger. Two half-inch planks, four to six inches in width, are then placed outside the body, their lower edges resting upon the projecting plugs, and are gradually bent inward at either end, following the curve of the body, until they meet at the bow and stern. The ends of these planks are sawn diagonally to make the joint as tight as possible. These planks are nailed to the body of the canoe and to each other. Small triangular pieces of plank, resting upon the top of the dugout underbody, are usually inserted at bow and stern, forming a short deck at either end. Ordinary commercial hard pine is used for these and for the side planks. No caulking is used; the joints between the body and the sides planks are sealed with several coats of paint.

All canoes are provided with outriggers. The form now in use, which has replaced the original form throughout the group, is known to be the invention of a mulatto who settled in the valley of Tahuku, Hiva Oa, a few years ago. The rapid dissemination of this invention

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indicates the speed with which new appliances of obvious value are accepted by the natives. The new outrigger is indirect, and consists of three elements, the float, the uprights, and the crosspieces. The float consists of a peeled log of fau wood four to five inches in diameter, slightly shorter than the canoe. This is usually sharpened at the forward end only, the cutting being done entirely from the lower side, but a few specimens were seen which had been sharpened at both ends, apparently with the idea of making the canoe completely reversible. The uprights, about two feet long, are usually made of small barrel staves. A triangular notch about two inches deep is cut in the upper end. Eight inches below this notch the uprights are pierced by a rectangular hole an inch and a half to two inches square. These uprights are permanently attached to the float. The unnotched ends of the staves are wedged into longitudinal slits near either end of the upper surface of the float. The crosspieces are peeled poles of fau or hard wood about eight feet long and three inches in diameter at the butt. Their outer ends are sharpened so that they will readily pass through the rectangular holes in the uprights.

The outrigger is assembled and attached as follows: The squared ends of the cross poles are fitted into the holes of the uprights, their points projecting about two inches on the outer side. The whole outrigger is then placed on the right side of the canoe, the crosspieces extending across it on the line of the hard wood plugs, with their butts projecting a few inches beyond the left gunwale. One end of a light rope is then fastened to the projecting end of the front crosspiece, outside the upright. The rope is then carried over the top of the upright, through the notch, and along the crosspiece to the inner side of the right gunwale. It is then passed back and forth diagonally over the crosspiece and around the inside and outside ends of the plug until the crosspiece is held rigidly. The rope then runs along the crosspiece to the left gunwale, where the same lashing is repeated. Some slack is then left in the canoe, and the left end of the rear crosspiece is lashed, the rope passing from there to the right gunwale lashing the crosspiece there, and out along the crosspiece and over the end of the upright to the outer end of the crosspiece, where it is tied. Any rope left over is carried back along the crosspiece and coiled in the canoe.

An outrigger of this sort can be attached or removed in a few moments, and the single rope used to lash it is available for other purposes when not in use on the canoe. When a canoe is beached the owner usually removes the outrigger at once and stores it in a safe place, thus making the canoe useless and safeguarding it from theft.

Small fishing canoes of the type described are rarely used for trips of any length. They are not sailed but are commonly paddled by two men. One man sits on the stern crosspiece of the outrigger where it crosses the boat, while the other wedges himself between the thwarts amidships. Most of these canoes are completely reversible, and they are sometimes paddled with the outrigger on the left instead of the right. The narrowness of these craft, and their high center of gravity (for the paddlers sit practically on top of the canoe) make them very unstable, and in spite of the outrigger they frequently capsize. The natives right them by getting on the outrigger and forcing it down under the canoe and up the other side.

VAKA POTI

The *vaka poti*—a craft that appears to be a local development—is an interesting example of the native adaptation of European ideas. It may be described as follows:

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As the name indicates, the *vaka poti* is a hybrid of canoe and boat, and is larger and more seaworthy than the fishing canoe, being twenty to twenty-five feet long with a maximum beam of two to two and a half feet. A long strip of breadfruit or temanu wood, eight inches to a foot in width, about four inches thick and tapering to a point at both ends, serves the double purpose of keel and bottom. It is smoothly rounded on the outside and slightly hollowed along the center of its upper surface. This is probably an extreme modification of the dugout underbody of the old built up canoes. Longitudinal slots are cut in either end of this keel and into these two flat, slightly curving pieces of temanu wood are bolted. These serve as the stem and sternposts of the boat, and are identical in form. Short light ribs are then bolted to the keel along both edges, their short lower arms resting upon its upper surface. The sides of the boat are built up with thin planks of commercial lumber which are laid on with an overlap from above downward—that is, the boat is clinker built. These planks are carefully dressed along the points of contact to insure a tight joint, and are fastened into grooves in the sides of the stem and sternpost. The gunwales are finished with a narrow flat strip of wood. At either end of the boat, immediately below this strip, a triangular piece of plank is put in, decking the last two or three feet of the bow and stern. The boat is braced by three broad flat thwarts which also serve as seats. One of these thwarts is placed in the middle and the other two at either end, two to three feet within the edges of the end deckings. The forward thwart is pierced with a hole three or four inches in diameter which, with a corresponding block on the keel, serves to step a mast. These crafts are always provided with an outrigger similar in shape and attachment to that of the fishing canoe, but of proportionately greater size.

Alexander, who visited Nuku Hiva in 1899, saw a slightly different form of outrigger in use with the *vaka poti*. He says (2, p. 746): "From the gunwale to the outrigger float of these canoes is an average of 7 feet. The outrigger frame consists of five pieces of wood, namely, two poles or crosspieces seized across the gunwales 4½ feet apart, one forward and the other aft of center; two stanchions connecting crosspieces of the outrigger float, and a brace which is seized to crosspieces just outside the gunwale. That part of the crosspieces between the gunwales answers the purpose of thwarts, the upper side being hewn to a flat surface. The outboard ends are sized to the perpendicular pieces, or stanchions, the length of which is, as a rule, the distance from the gunwale to the water line. These pieces are sized to the top side of the float, the sizings extending all the way around the float, but done so neatly as to offer little resistance to the water. The crosspieces, float, and stanchions are braced with withes to prevent them from being twisted and thrown out of position by coming in contact with rocks. . . . The material used in sizing the outrigger frame together is coconut fiber twisted into a small line."

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A *vaka poti* is normally handled by four men, one of whom sits in the stern and steers with a paddle while the other three row with short oars of ordinary European form. The bow and stern oars are placed on the side opposite the outrigger, the middle oar on the outrigger side, working within it.

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Every craft of this sort is provided with a leg of mutton sail of canvas like that commonly used on ships' boats. When not in use the sail is stored under the short deck at one end of the boat, while the poles which serve as mast and boom are lashed along the crosspieces of the outrigger. The heavier of these poles, which is about nine feet long, serves as the mast. When the sail is to be hoisted, the mast is passed through loops of string tied along one edge of the sail, the loop nearest the masthead being firmly tied to the pole. Two light ropes are then attached to the masthead opposite each other and the mast is stepped, the butt passing through the hole in the forward thwart and resting in the hollowed block in the keel. The two ropes from the masthead are then fastened to the forward outrigger crosspiece just outside the gunwales of the canoe. A third rope is sometimes run from the masthead to the prow, but this is not common. The lighter pole serves as the boom and passes through the loops along the lower edge of the sail. The outermost loop is firmly tied to the boom, and a rope is attached to its outer end. The boom is then gradually thrust outboard until the sail is fully spread and only the inner end of the boom rests against the mast. This end simply rests against the mast and is not attached to it.

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501 accounts and the fragmentary examples surviving in various parts of the group, it is possible accurately to reproduce the type.

501 824 Four species of wood were used for the large canoes *mio* (*Thespesia populnea*), temanu (*Calophyllum inophyllum*), breadfruit, and hutu (*Barringtonia speciosa*). The hutu was considered least desirable. *Mio* was rarely used, as large trees of this species were rare and the wood was in great demand for other purposes. Breadfruit wood was usually used for the smaller and poorer boats, while the best craft were made of temanu. Even at the present time there is some very large timber in the Marquesas (one temanu tree over ten feet in diameter was seen) but there is no native tree which produces a long straight stick at all comparable to the New Zealand kauri, and in very large canoes it was usually necessary to make the underbody in two or more sections which were dovetailed together.

396 313 322 Before the introduction of metal very large trees were felled with fire, but the shaping and hollowing appears to have been done entirely with tools. From a chant collected by Handy (personal communication) the tree appears to have been stripped of its bark and possibly of its branches before felling. The shaping was begun as soon as the tree was felled, the green wood being tougher and more easily worked. The tools used were stone adzes of various sorts, chisels and rubbing stones. (See chapter on Stone Artifacts.)

396 501 The building of large canoes was in the hands of *tuhuna* (skilled workmen) who merely supervised the work, leaving the actual labor to the friends and relatives of the owner. According to informants in Pua Ma'u, Hiva Oa, four hundred men (probably an exaggeration), under the direction of four *tuhuna*, were employed upon the last war canoe built there. The work was all done at the place where the tree had been felled, which in this case was high up the valley. Here a large decorated house was built for the workmen, who lived there with the directing *tuhuna* and were fed by the chief for whom the canoe was made. Twenty men are said to have been required to gather the food. The place was tapu to women and to all natives from other valleys. According to an informant from another valley some famous warrior slept in the unfinished canoe body every night in order that his mana might strengthen the wood and keep it from splitting. The completed canoe was carried down to the beach, probably in sections, and launched. [For an account of the ceremonies attending canoe building and launching see Handy (32)]. In Pua Ma'u the war canoes were kept assembled in special houses at the beach. These houses were undecorated and appear to have had no ceremonial significance beyond the fact that they were tapu to women. Each war canoe was named, a new canoe was given the name of a former one

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which had been worn out or damaged. The names of the Pua Ma'u canoes were Vaimakamaka, the largest and most important, Vaioto, Taipehe and Meaupiau.

The canoe normally consisted of nine parts, the underbody, bow piece, stern piece, two side planks, and four strips used to cover the side seams. Certain other parts were occasionally added. Each of the large sections was usually hewn from a single piece of wood, while the strips were made of bamboo.

The underbody of one large canoe and part of a second underbody, which had been made in two pieces, were seen in the valley of Hakaui, Nuku Hiva. The history of these objects had apparently been forgotten by the Hakaui natives, but according to Atu Ona informants one of the underbodies belonged to a canoe called Mo'ote which was made in that valley by a *tuhuna* named Kaneautia. This canoe was sent to the chief of Hakaui by a chief of Atu Ona in exchange for *enamoa*, a yellow paint or dye used for anointing the body, prepared in Nuku Hiva by a secret process. The debris of a great temanu tree from which this canoe is said to have been made is still to be seen in Atu Ona.

Hakaui informants said that the two underbodies had belonged to separate craft, not to a single double canoe. On the other hand Christian (10, p. 180) mentions two old canoes in this valley which, from their location, seem to be the same as those here referred to and gives a photograph of a large double canoe, unquestionably Marquesan, which he implies belongs with the reference. In this photograph each of the canoes appears to be complete in itself while the attachment consists of three cross poles, easily removable. It seems probable, therefore, that these canoes were used both singly and together.

A study of the complete underbody—which had been exposed to the weather and was much rotted and warped—brought out the following particulars:

It was 40 feet, 6 inches in length, with a maximum central width of 4 feet, which tapered to 2 feet, 6 inches at the ends. The original depth could not be accurately determined. The two ends of this underbody were identical.

The section of an underbody was much better preserved, having been stored under an overhanging cliff which protected it from the weather. If the underbody of which this had formed a part was similar to the complete specimen it must have been over 60 feet in length. Some old canoe models, which appear to be very accurate, clearly show that the two ends of underbodies were not always the same, the forward end often being made much broader and deeper to facilitate the firm attachment of the bow piece. The extreme shallowness and narrowness of the outer end of the section proves that it was the stern, and if we assume that the whole underbody was of the broad bowed type it is possible that it was not more than 40 to 45 feet in length. The dimensions of the section were as follows: Length 34 feet, 11 inches; maximum width (at a point 4 feet from the inner end of the section) 3 feet, 4 inches; width at stern, 1 foot, 6 inches; maximum depth (outside) 1 foot, 9 inches; depth at tip of stern 4½ inches. The walls were 1½ inches thick at the upper edge, increasing gradually to 2¼ inches in the center of the bottom. The cavity of the underbody had, in cross section, the form of a rectangle with rounded corners. The middle of the canoe was flat bottomed, becoming gradually more rounded toward the stern.

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396 501 The rim of the underbody was flat and straight throughout its length, except for the last six feet of the stern where the walls of the underbody were thickened to form a longitudinal ridge about two inches below the upper edge. (See Pl. XLII, *A*.) The lower part of this ridge curved smoothly into the contour of the bottom, while the upper part ran back in a flat bevel at an angle of about 40 degrees to the line of the outer edge of the flat rim. The bow and stern of all underbodies appear to have been finished in this way. The tip of the underbody was cut squarely across, and the outside was flat and vertical. The rim was somewhat broader here than along the sides and had, in the center of its interior surface, a broad, rounded point, left at the time of its excavation. This feature is shown in small canoe models, and both the bows and stern of underbodies were probably finished in this way. The projection corresponded to a similar projection on the under surface of the stern and bow pieces, and no doubt helped to strengthen and make rigid their juncture with the underbody.

The inner end of the canoe section observed at Hakaui was especially interesting as it showed the method of finishing a joint. The bottom was cut squarely across, and had no holes for lashings. The sides were cut back for a distance of two feet, the lower edge of the cut sloping upward gradually until its perpendicular inner end was only eight inches high. The surfaces of the side cuts were beveled, running to a thin edge on the inside, and were pierced with triangular holes for lashings. (See Pl. XLII, *B*.)

A row of similar holes was pierced through either side of the underbody about an inch below the rim. There were no holes at the ends. The lashing holes were an inch and a half in width and approximately an inch in depth, the base of the triangle being upward, and were placed at intervals of five to six inches.

Along each side of the section there was a row of three small projections which had been left at the time the canoe was hollowed out. These projections were six inches wide and five and a half inches high, the upper edges were two inches below the rim of the underbody. They had been carved into the form of squat human figures with disproportionately large heads, but the details had been practically obliterated. The projections were arranged in pairs, facing each other; the interval between pairs was 9 feet. 11 inches. The natives could give no information as to their purpose, but it seems certain that they served as supports for thwarts or seats. The complete underbody had no projections of this sort and these projections do not appear in any of the models studied.

224 Both underbodies were made of temanu wood and had been carefully rubbed down inside and out, obliterating all tool marks and giving the surface a finish as smooth as that of an ordinary bowl.

The Bow Piece

So far as known no bow pieces of Marquesan built up canoes have survived but excellent descriptions which check up with the accounts of early voyagers and the old canoe models were obtained from informants.

In a canoe with a forty-foot underbody the bow piece would be about fourteen feet long. Its shape (difficult to describe) can be seen from the accompanying photograph of a section of an old and apparently very accurate canoe model (Pl. XLIII, *A*). For the sake of convenience in description the bow piece may be divided into three parts, the deck, the neck and the figurehead. The deck was the rearmost section, which was enclosed between the ends of the side planks and bounded in front by a transverse flange, the breakwater, which kept head seas from entering the canoe. The deck of the bow piece was of the same width as the underbody, with a flat upper surface and vertical sides. The under surface was deeply hollowed, the lower edges being of the same width as the sides of the underbody upon which they rested. Triangular lashing holes were pierced through the sides a short distance above the lower edge,

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while two other holes, one on either side, were pierced through the angle formed by the top and sides about half-way between the breakwater and rear end of the deck. The upper lashing holes, which served for the attachment of the ends of the side planks, did not pierce the cavity of the bow piece. 396 501

The neck, or portion lying between the breakwater and the figurehead, was two to three times the length of the deck. Its upper surface was flat, and was the same width as the deck immediately in front of the breakwater, tapering gradually toward the forward end. Its lower surface was hollowed for about one-half its length, the outer end of the excavation being cut to leave a semicircular projection like that already mentioned in the description of the ends of canoe underbodies. Beyond the end of the excavation a heavy flange projected downward, its lower edge being flush with the bottom of the end of the underbody when the bow piece was in position. On the outer side this flange curved up smoothly to the base of the figurehead. The lower edges of the sides of the excavated portion fitted accurately to those of the underbody, and were pierced with lashing poles. Above the edge, however, the sides sloped inward, the flat upper surface of the neck projecting beyond them on either side in a longitudinal flange.

The angle which the neck formed with the body of the canoe seems to have varied considerably. In the specimen photographed the neck is practically parallel to the upper edge of the underbody, and the early accounts and pictures would seem to indicate that this was usual. According to informants, however, it curved upward sharply beyond the end of the underbody, and all the recent canoe models show this feature in more or less exaggerated form. In the double canoe shown by Christian (10, p. 180), the neck of the bow piece of one canoe is of the form already described and curves upward at only a slight angle, while the neck of the other canoe curves up much more abruptly. In the second specimen the upper surface of the neck does not project over the sides, but curves down into them smoothly, as in the normal stern pieces.

The form of the figurehead and its relation to the neck can best be described by comparing it to a long handled shovel laid back up, the neck corresponding to the handle and the figurehead to the blade. The base of the figurehead projected out sharply from the neck on either side, while the forward end was semicircular or was bluntly pointed. The upper surface was convex, the point of greatest thickness being at the middle of the rear end. It was carved into a single, large, flat face, chin forward. The convention was the usual one except that the broad mouth was crescent shaped, and the ears were represented by thin semicircular flanges which projected from either side of the head just beyond its juncture with the neck. [532]

The Stern Piece

Two forms of stern piece were employed in the Marquesan built up canoe. The one shown in the accompanying picture (Pl. XLII, *E*) is apparently the commoner type. For the sake of convenience in description this form may be divided into three parts—the body, deck and tail.

The body of the stern piece was that part which rested upon the underbody of the canoe. It formed a third to a half of the total length of the stern piece, supporting the deck and tapering off into the tail at the rear. The lower surface of the body was deeply hollowed, while the outer sides curved inward gradually meeting in a distinct ridge along the median line of the upper surface. The lower edges were cut to conform accurately to the upper edges of the stern of the underbody, and were pierced with holes for lashings. The rear end of the body terminated in a heavy, downward projecting flange which rested against the stern of the underbody and was identical in form and arrangement with the corresponding flange on the bow piece.

The deck, although hewn in a single piece with the body, had the appearance of simply resting upon it, its sides and rear edge projecting beyond the sides of the body. Its upper

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surface was flat and almost rectangular, curving up into a transverse flange at the rear. At the forward edge of the body there was a narrow vertical flange, extending from its lower edge to the deck, which served to make a close joint between the stern piece and the side planks. The edges of the deck were pierced with two vertical lashing holes which served for the attachment of the ends of the side planks. The inner end of the stern piece was sometimes considerably thicker than that of the bow piece, raising the level of the stern deck. When such was the case the height of the transverse flange at the rear end of the deck, really a stern breakwater, was less than that of the bow breakwater. The upper edges of the two breakwaters were always at the same level.

In the two oldest canoe models studied, a long oval projection with an almost circular depression in its upper surface extended from the center of the stern breakwater over the body. The only genuine stern piece seen did not show this feature and it is not found in the more recent canoe models. The purpose of the projection was not learned.

The stern piece narrowed rapidly to form the tail, a long flat projection, like a thick plank with the edge up, which rose from the body of the stern piece at an angle of twenty to thirty degrees. It might be either straight or slightly curved, and was pierced near the outer end and along its length with two or more holes, or slots, which served for the attachment of various ornaments.

The stern piece of one of the large canoes in Hakaui referred to (p. 303), is said to have been eighteen feet long and of the type just described.

In the second form of stern piece (Pl. XLII, *C*) the deck and body parts were of the same form, but the rear end fitted down closely upon the stern of the underbody, without overlapping or projecting beyond it. Informants insisted that all canoes had the high tail piece, but were uncertain how it was attached to this form of stern. Fleurieu (23, pp. 131 to 132) says: "The stern is made of two planks four inches high, placed on edge and rising in the form of an elongated and flattened S." Stewart, an unusually trustworthy observer says: "From the keel on each side a light round timber extended, curving gradually upward like the runners in the front of a sleigh, and terminating in a broad flattened blade, six to eight feet above the water." (59, p. 244.) It seems probable, therefore, that in stern pieces of the sort just described the tail was made in two pieces which were lashed one on either side of the canoe.

Side Planks

The side plank of a Marquesan built up canoe was a flat piece of wood of the same thickness as the rim of the underbody and a foot to a foot and a half in width (Pl. XLII, *G*).

The upper edge was hewn into a narrow gunwale, the inside of which was flush with the surface of the plank, while the outside projected as a narrow flange. The lower half to two-thirds of the plank was cut away at either end in a long curve, so that while the length of the upper edge was equal to the distance between the outer surfaces of the breakwaters when the bow and stern pieces were in position, the length of the lower edge was only slightly greater than the distance between the inner ends of the bow and stern pieces. At the points of contact of the side planks with the end pieces, the inner surface of the planks was cut away to insure a tight joint, the cutting being deepest at the lower edge and becoming gradually shallower toward the top. As a result of this, the upper part of the side plank was forced out somewhat when it was in position so that the whole plank formed a slight angle with the sides of the underbody.

A series of triangular lashing holes, corresponding to those of the underbody in size and position but with the base down, were pierced through the side planks a short distance above its lower edge. Additional holes for the outrigger lashings were made through the upper edge immediately below the gunwale. There were usually three of these, the two outer holes being placed a short distance within the points of contact of the side plank with the bow and

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stern pieces, while the third was midway between them. Other lashing holes were pierced through the lower edges of the projecting ends of the side plank and served to attach it to the bow and stern pieces, while still others were made under the gunwale at either end to serve for the attachment of bow and stern platforms. Where a supplementary breakwater was used, holes for its attachment were pierced through the forward ends of the side planks near their outer edges.

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The Strips

Four strips were used to cover the seams between the underbody and the side planks, bow and stern pieces.

The strips were of unequal length, the two outside strips extending the full length of the underbody while the inside strips only covered the space between the inner ends of the bow and stern pieces. The upper edges of the inside strips were cut away for a short distance at either end so as to form a close joint with the lower corners of the bow and stern pieces. The strips were made either of soft wood or bamboo and were an inch to an inch and a half in width. When bamboo was used a stalk was split lengthwise and the divisions at the joints cut out. The wooden strips were rounded on the outside and hollowed longitudinally on the inner surface. On long canoes the strips were made in several sections, but there seems to have been no definite order in the arrangement of these. Although the edges of the strips were cut to fit the sides of the canoe as accurately as possible, their purpose appears to have been to protect the pad used between the underbody and the upper sections rather than to make the seam watertight.

Other Canoe Parts

Other elements were sometimes incorporated into the built up canoes.

A supplementary breakwater was in common use (Pl. XLII, *F*), consisting of a thin plank, in the form of a broad flat crescent with stubby points, which was sometimes attached to the upper edge of the bow breakwater. The lower edge of this plank rested upon the top of the breakwater and was accurately fitted to it, while the sides projected beyond the sides of the bow piece. It was attached by lashings to the center of the breakwater and at the ends of the side planks.

A second feature, of greater ethnological interest, was the use of bulkheads. No information was obtained from the natives in regard to bulkheads, but they are shown in certain canoe models and are mentioned by Porter in his description of the Ua Huka canoes. He says: "Three pieces of thin plank, placed in the manner of partitions, divide the interior into four parts and perform the office of timbers to keep the vessel from separating or closing." (49, p. 79.) Judging from the models, these planks were cut to fit accurately the interior of the canoe, being notched on either side to accommodate the strip covering the side seam. The tops were flush with gunwales to which, in one model, they were fastened by single lashings near the top on either side.

It is probable that thwarts designed simply to strengthen the canoe were not used, but the war canoes had seats for paddlers. According to informants the seats were flat planks resting upon the top of the inside strips. Large canoes might have as many as ten seats.

ASSEMBLING THE CANOE

In some of the larger valleys the canoes were kept in special houses on the beach, and were probably left assembled at all times. According to informants in other places, canoes were usually taken to pieces as soon as they were beached and the parts carried up into the valley. A highly probable explanation of this

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396 practise, which involved much unnecessary labor, is given by Porter (49, pp. 101-
501 102). He says:

[422] Each piece, and indeed each paddle has its separate proprietor. To one belongs the piece projecting from the stern, to another the part forming the bow. The pieces forming the sides belong to different persons and when a canoe is taken to pieces, the whole is scattered throughout the valley and divided, perhaps, among twenty families. Each has the right of disposing of the part belonging to him, and when it is to be set up each brings his piece with materials for securing it. The setting up of a war canoe goes on with the same order and regularity as all their other operations.

Mention of this curious system of ownership is also made by Desgraz (15, pp. 281-282) but as his book appears to be a little more than a compilation from earlier sources, this can hardly be taken as a verification.

It seems certain that there must have been a definite order in which the various sections were placed in position, but no exact information was obtained on this point. The structure of the canoes, however, partially indicates the following sequence:

The first step must have been to arrange the pads which took the place of caulking between structures or sections. There were four of these, two being placed along the sides of the underbody and one at either end. The side pads consisted of two thick flat ropes, of the same length as the underbody, each of which was plaited from three strands of coconut husk fiber. Cellular tissue of the husk was left adhering to this fiber, probably with the idea of filling the interstices and making the finished seam more nearly water tight. These ropes were laid along either edge of the underbody, being held in position by continuous bark strings which fastened them to the underbody at each lashing hole. The end pads were made from a number of the fiberous leaf sheaths of the coconut which were spread out flat with their upper ends resting on the top of the underbody and their lower ends bending down over its flat vertical bow and stern. They do not seem to have been attached to the underbody in any way.

The next step was to place the bow and stern pieces in position, and then the side planks. Whether the bow and stern pieces were attached before the side planks were put on is uncertain, but it seems probable that the whole superstructure was lashed to the underbody in a single continuous operation. In the models the lashing of each side is done with a single continuous line, beginning at the bow.

[284] The lashings were of broad three-plait coconut fiber cord considerably heavier than that used for house lashings. This was passed several times through the upper and lower lashing holes, outside of the strips, the outer side of the lashing being flat, the full width of the hole, and only one cord thick. According to one informant a large wooden needle, with the point barbed on one side was used to facilitate passing the cord in and out. (See section on Miscellaneous Tools.) The upper ends of the side planks were attached to the bow and stern pieces by small lashings, each of a single piece of cord tied on the inside. The inside lashings are said to have been ornamented on some canoes with designs derived from string figures.

CAULKING

501 The lashings of the underbody and superstructure did not completely fill the
396 triangular holes provided for them, and the openings were caulked with pieces of
314 coconut husk wadded up and beaten in with a wooden mallet and pointed stick. (See
[237] section on Miscellaneous Tools.) The seams at the ends of the canoe were calked with feathers, beaten in.

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with feathers, beaten in. Langsdorff (38, p. 173) says that the seams were covered with the gum of the breadfruit tree, but this was not mentioned by informants or by any other early visitor. All accounts agree that the craft leaked so badly that one or two men were kept constantly employed bailing.

THE OUTRIGGER

All canoes, when not fastened together in pairs, were provided with outriggers. Quiros (50, p. 28) says that they had "outriggers of cane on either side, after the manner of the gunwales of galleys." Porter (49, p. 102) also mentions the use of double outriggers in connection with large canoes differing somewhat from the type now under discussion. Canoes appear, however, to have been normally fitted with a single outrigger on the right side.

This outrigger was of indirect type, consisting of crosspieces, uprights and a float. In the smaller craft two crosspieces only were used, in the larger canoes there were three, the third being in the middle. These crosspieces passed over the canoe, their right ends projecting beyond it, and were lashed firmly to the side planks by cords passed through holes in the upper edges of the side planks.

Each of the uprights consisted of four or six small sticks or splints. When four sticks were used they were placed two on either side of the crosspiece, and the lower ends of each pair rested together, the upper ends being some inches apart so that they formed a V. Each of these V's in turn sloped outward from the crosspieces: their attachments to the float were a foot or more apart. Informants say that this form of upright, although much more difficult to make than the modern one, was superior to it. In landing through a heavy surf the forward end of the float often strikes bottom, and with the modern heavy upright the canoe is turned end over end. When the old upright was used the thin sticks of which it was composed broke easily, and the canoe would land without capsizing. The lower ends of the uprights were wedged into slots in the upper surface of the float, which consisted of a hibiscus log sharpened at the forward end.

CANOE PLATFORMS

According to old accounts the large war canoes were provided with platforms at bow and stern, while Porter (49, p. 101) mentions an additional central platform on which the chief sat. The use of such platforms is only vaguely remembered by the natives and these platforms are not shown in the newer models. Stewart (59, p. 244) says that the platform was made of small sticks and covered with a mat, and that the stern platform was considerably higher than the one in the bow. In two old models the stern platforms are made as follows:

Two rather large peeled sticks were laid across the canoe, the inner stick being close behind the forward end of the stern piece while the outer was just in front of the breakwater. Two other poles were then laid across the ends of these, lengthwise of the canoe, and the whole lashed to the side planks with bark rope passed through holes in the canoe. The rear ends of the second pair of poles projected slightly beyond the stern breakwater. Two more cross poles were laid on the ends of these, above which two very long poles were placed lengthwise, their tips projecting back almost to the tip of the upward curving tail. The four upper poles were then lashed to the frame formed by the four lower ones. The bow platform was built on the same principle except that the tops of the second set of poles were flush with

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396 501 those of the supplementary breakwater, and two long poles like those of the stern platform were lashed to these, one on each side. The tips of these poles projected forward almost to the figure head. In rear platforms the top of the cribwork was probably floored in some way. The platform was quite small, and according to the early accounts, was occupied by only one man.

DECORATION OF CANOES

501 531 Canoe decorations fall at once into two classes—carvings and decorations incorporated into the canoe and temporary decorations. The use of ornamental lashings has been mentioned, but no details are available.

All informants agree that the bow and stern pieces, and less commonly the side planks, of large canoes were carved. The figurehead, at the forward end of the bow piece, consisted of single large flat tiki face but the designs used on the other parts of the canoe are said to have been either angular-geometric, like those used on house posts, or curvilinear like those used in tattooing. The bow and stern pieces of most canoe models are decorated with angular-geometric designs and these appear to have been more commonly employed on the actual 501 canoes. There was a tendency also to decorate the neck of the bow piece with 532 figures carved in high relief or by the attachment of separate pieces. One old canoe model (Pl. XLIII, *A*) has, down the center of the bow, two recumbent figures placed face up, with their feet together and their heads touching the front of the breakwater and the back of the figure head. They are carved in one piece with the bow, but are in almost full round, the only points of attachment being the tops of their heads and their buttocks. The bow piece of a second old model has down the center of the top a flat longitudinal ridge to which is lashed a thin vertical plank pierced with two large holes. The rear edge and bottom of this plank form a right angle and the forward edge is curved. In the picture of a Marquesan canoe given by Cook (14, p. 307) the bow has along its center three projections, evidently thin planks two or three feet long, which are recurved at the upper end, like pruning hooks, and have on the back two points. In front of these points large triangular holes are pierced through the plank. Porter (49, p. 79) says that some canoes of Ua Huka had on the bow a small board supported by a rudely carved figure of a man. The more recent models show no trace of these neck decorations. They seem to have been replaced by temporary decorations at an early time.

A small tiki figure was attached to the tip of some of the stern pieces. Stewart (59, p. 244) says that between the two sticks forming the tail of the canoe "a rude image of a god was suspended in a reclining posture." This is verified by a canoe model which has attached to the tip of the stern piece two broad wooden blades which project backward, diverging slightly. Between these blades there is a small tiki figure, facing the canoe in a nearly horizontal position. In Pua Ma'u a small full figure tiki was carved on the top of the tail piece.